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Renewable Energy and the Sustainable Campus
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*Much Ado About Paper Cups*
Introduction

In today’s world people have come to expect convenience. We like to have anything we want whenever we want it. Online shopping, fast food, and smart phones are commonplace in our culture, and most people do not stop to think about what it means to have access to all of these modern day “necessities.” Being able to grab a coffee, take it wherever you go, and then toss the cup in the nearest trashcan is another expectation people have come to have. There is no extra monetary cost to individuals, so there is no incentive for the average person not to enjoy this convenience.

Williams College uses a huge amount of paper cups each year. I conducted a short survey to gauge student use of the paper cups available on campus. As seen in Figure 1, 93% of respondents use the paper cups, and over a third of student respondents (34%) reported using five to ten cups per week. Almost 50% reported using between one and five cups per week. Students are on campus for between 30 and 40 weeks per year, so that adds up quickly.

In terms of food composting, Williams does a fine job. Most people compost most of their food, and dining services does a pre-consumer sort of most food scraps. We compost approximately 80 tons of food scraps each year, which saves us at least $6,400 in waste removal fees. Currently, Paul LaLiberte is employed by Dining Services to pick up the compost from Whitman’s, Driscoll, and Mission dining halls daily and bring it to the large collection bin behind Mission. This bin only fills about twice per year, and when it does, it is emptied and the compost is brought to Caretaker Farm in Williamstown, MA.

The most common alternative to composting is sending trash and waste to a landfill. This is problematic for many reasons. We are running out of landfill space, which means more sites are going to be taken over and used for landfill purposes, destroying habitats in the process. Landfills create a toxic “soup” from all the chemicals, plastics, and other substances that are mindlessly dumped. They also produce methane, one of the strongest greenhouse gases, which negatively impacts the air quality in the areas around landfills.

Paper cups are a huge portion of the waste at Williams College, so figuring out how to compost them or eliminate them would be a great step towards greater
sustainability at the college. I investigated four possible scenarios that could play out in the coming years: business as usual, returning to cheaper, non-compostable paper cups, starting an initiative to collect and compost used paper cups, and completely eliminating paper cups by implementing a campus wide reusable mug program. Each scenario has different economic and environmental costs and benefits that need to be calculated and analyzed.

Behavioral psychology is a hugely important tool to use when trying to maximize the efficacy of sustainability programs. Humans' nature drives us to want to be a part of the social in-group, so using language and advertising that indicates that composting is the norm and that most people do it, will be the best way to encourage compliant behavior. This involves using the right combination of injunctive and descriptive norms to convince people that most students at Williams do compost and is also the morally correct thing to do (Caldini 2003).

Setting

Currently at Williams, paper cups are a part of our culture of haste and crazy productivity. People use hundreds of cups every year without thinking about the impact on a larger scale. They are available at every dining hall except for Driscoll, which recently went paperless and implemented a reusable mug program. People use cups for hot beverages in the morning, taking snacks to go out of the dining halls all throughout the day, and sometimes even for drinks when they are staying in the dining hall. Seeing people with a paper coffee cup is one of the most common sights at Williams.

We purchase the Bare® by Solo® brand of “ecotainer” paper cups. These cups have pleasant images of leaves on the sides, and remind us that they were created from “100% renewable resources.” (Figure 2) Paper and trees are indeed renewable resources. All paper cups come from renewable resources. However, seeing this “eco-friendly” design, and being reminded that their cup comes from a renewable source makes people feel much better about using the product. This “green wash” effect eases people’s consciences, and companies like Solo can charge more for their line of products. Solo has partnered with the Biodegradable Products Institute, which does confirm that their product meets the American Society for Testing and Materials’ standards for
compostability, which specify that 90% of material must break down within 180 days in a controlled facility at 135 degrees Fahrenheit. Some Bare Solo products are made with up to 20% recycled materials, but not all of the paper cups are.

Right now we compost mostly only our food waste, along with the compostable paper napkins available in the dining halls. The process is in a transition phase, as we used to do more frequent deliveries from the college to the compost locations. It is advertised that napkins can be composted, and it is perfectly convenient to put napkins in the compost along with food, so the majority of napkins are composted. This same logic should apply to the compostable cups that we have all over campus.

Dining Services wants to have eliminated paper cups from campus by this fall. This is a lofty goal, but a worthy one nonetheless.

Method

I gathered most of my information through conversations with Dining Services and the Zilkha Center, but also created a short survey to gather information about student use of and knowledge about the paper cups on campus. I posted the link on Facebook and had 53 respondents. The questions varied from how many cups people used, to their awareness of their compostability, and how likely they would be to compost them if we made it easier on campus.

Results

Business as Usual

Before examining how we could change, we need to understand what we are doing currently. As seen in Table 1, Williams College Dining Services purchases 491,000 “ecotainer” paper to-to cups per year currently. They vary in size from 4 to 16 ounces, but the most common are the 12 ounce variety that are available at Mission, Whitman’s, EcoCafé, and Lee Snack bar. This number will be smaller next year due to the Driscoll reusable mug program, which already saves between 100 and 200 cups per day. The college spends over $36,265.91 per year just purchasing these paper cups. This does not include the cost of taking trash to the landfill. There is an $80 tipping fee for each ton, plus a service fee that covers the pickup, so each ton of trash costs the College
$300 dollars to haul. While we have not done a waste audit to know exactly how many tons per year consist of paper cups, we know that a significant number of cups are ending up in the garbage since only 7.7% of survey respondents reported “always” composting their paper cups (Figure 3). If each cup weighs an average of about five ounces, 491,000 cups comes out to close to 82 tons of garbage, which costs Williams $24,550 to haul away! A negligible amount of people always composts the paper cups, and this has much to do with the fact that there is no encouragement from the college to do so. 32% of survey respondents did not even know they were compostable (Figure 4). There are signs (albeit, sometimes confusing and conflicting ones) in the dining halls that tell students to compost their brown paper napkins, which is very effective in terms of awareness. If Williams makes no changes and business continues as usual, the majority of our compostable cups will continue to go to the landfill, the compost program will not be expanded, and there will be no effort made to try and get people to start composting the paper cups.

*Buying Normal Paper Cups*

Currently, dining services purchases compostable cups for a greater cost than a normal paper to-go cup. While we know that the environmental effect is essentially the same, since such a small percentage of the cup ends up in the compost, to most people using the cups pleasantly labeled “ecotainers,” it seems like they have made a more sustainable choice. If people are not composting the cups, does it not make more economic sense to save the difference in cup cost? To purchase the same amount of plain, non-compostable paper cups per year that Williams does currently would cost $18,011.02, which is less than half of what we spend on the Bare Solo ecotainers. There would be a negligible difference increase in trash created since such a small percentage of people consistently compost every paper cup they use. The difference in environmental impact from our current practices would not be large since the cups would take up the same amount of space in the landfill. People might even experience more guilt about using a cup that does not advertise being “eco-friendly,” and decrease the amount of cups that they use. Unless the production processes between the compostable cups and non-compostable cups are wildly different, the environmental impact does not differ greatly between these two scenarios.
**Going Completely Reusable**

According to Dining Services, Williams College will be entirely paper cup-free by the fall of 2013. However, this scenario is relatively far away from being implementable. The benefits of eliminating paper cups from our campus are enormous. Right now, the college purchases a total of 491,000 “ecotainer” paper cups per year. Completely eliminating paper cups would save the approximately $36,000 per year that we spend on cups, and would also reduce the amount of waste that we produce. The service fee for picking up trash would stay constant, but we would save at least $80 per ton of trash avoided by not having disposable cups. If we are producing around 82 tons of trash just from cups, that would save the college at least $6,560 per year. Since we do not have an established program to reflect on, most of these numbers are predictions based on mostly speculation. In order to meet student demand, dining services would need to have at least one mug available for every student. 93% of respondents to my survey indicated that they use paper cups (Figure 5). To meet their needs, enough mugs would need to circulate that there is always a clean one available. Damage and loss would need to be taken into account as well. The current mugs at Dricoll cost $3 per cup. These are not BPA free, and students are not thrilled with the design of the cups. For $6-9 per mug we could have a much more pleasant mugs that would increase utility and student approval (Figures 6 and 7). 2,500 mugs at $9 each would cost $22,500, which is still a $13,765 savings from the purchase of paper cups. Table 2 shows all of the costs involved in this scenario. In order to provide the best mugs to fit student’s needs and wishes, we would need to do studies on campus. The University of Colorado did this in order to maximize the effectiveness of their reusable mug program. Adding more high quality mugs to the dining hall to encourage people not to use paper when they are staying in the dining hall would be helpful as well. People are turned off by the current mugs’ size and cheapness.

Another complication is the collection and cleaning process. In order for this to be effective there would need to be collection bins in every dorm, dining hall, library, and other convenient locations around campus. Dining Services wants to create a new student as a collector. This would add to the cost of the program. The student would probably be paid $9 per hour, but it is not yet clear how many hours per week the job
would entail. Students are limited to working 10 hours per week, and are only available for 30 weeks out of the year.

**Composting Our Paper Cups**

Implementing a system on campus that allows us to compost all or the majority of the paper would help us reduce the amount of trash we produce and put us on the path towards eliminating paper cups on campus. As detailed above, we would save around $6,560 on trash removal, combined with the benefits of not sending as much to the landfill. In order for composting of paper cups to increase on a grand scale, several steps need to be taken. First, creating more awareness of the compostability of the cups is a necessity. Using behavioral psychology we can create signs that inform and encourage people to put their cups in the compost the same way they do with napkins. Next, making compost receptacles available to people in more convenient locations around campus instead of just the dining halls would give people fewer excuses not to compost their cups. People are very used to the three tiered “Waste, Paper, Cans” bins that we have in many hub locations around campus (Figure 8). 70% of respondents to my survey said they would “definitely” compost their cups if there were easily accessible receptacles on campus, with another 19% responding “probably” (Figure 9). Adding a fourth “paper compost” would be a simple way to encourage composting right at the source of most of the disposal. As of right now, facilities is resistant to having food compost bins outside of the dining halls, so bins would be clearly labeled with exactly what could be put inside (only compostable paper items). The costs of this scenario include the purchase of around 50 large bins and the salary for the increased labor that will be involved in compost collection. Initially we are assuming 12 hours per week at $9 per hour, which corresponds to two students working six hours per week. Table 3 shows all the costs associated with this scenario. Depending on the success of an initial trial in a hub location like EcoCafé, the project would gradually expand to more locations across campus. The increase in paper and volume to the compost might induce a shift in our current composting as well. Caretaker farm would be happier to receive more frequent deliveries, but a greater percentage of paper might be better suited for Holiday Farm in Dalton, MA, which is a commercial composting farm. It could potentially make sense for us to separate the compost and bring the different types to the farm for which it is
better suited. Hopefully, we can first try to get students to reduce their use of paper cups, then make it possible for people to compost them as much as possible, all of which could lead to a gradual elimination.

**Discussion**

Each of the four scenarios has different sets of costs and benefits, both economic and environmental. Table 4 shows the costs, savings, and net costs to each scenario. If Williams makes no changes, we save no money from current practices, and do little to reduce our environmental impact. If we were to exchange the more expensive, compostable cups, for normal paper cups, we would save close to $20,000 per year from the difference in cup prices. Hauling rates would remain the same, and the amount of compost would not change drastically as a minimal amount of students consistently compost every cup they use. The environmental impact would not be drastically worse since the same amount of cups would be sent to the landfill. I unfortunately forgot to include a question on my survey asking whether or not people would be less likely to use the paper cups if they did not advertise being “eco-friendly.” I expect that some people might feel more guilt, but for the most part the numbers would stay relatively constant.

The best thing we could do right now is to use behavioral psychology to encourage people to decrease their use of paper cups, and compost the ones that they do use. In the long run, the best-case scenario is the reusable mug program. It saves about $30,000 the first year and then around $50,000 every year after that. We reduce the amount of waste we send to the landfill and constantly remind students that sustainability is an important part of living at Williams College. There are significant logistical issues however that will make this a complicated implementation. Gradual starts like the Driscoll reusable mug program are a good way to figure out what works and what does not. It also generally takes four years for a new program to gain full popularity. Resistance to change is natural, but once the incoming first years do not know anything different, there will not be a problem.

Composting the cups is a great step in the meantime as well, but it is the most expensive scenario. It would make more economic sense if we would be saving more in the pickup fee from the reduction of garbage, since that is the only main money saving
aspect of this idea. It is a logistically complicated scenario as well, but not as complicated as the reusable mug program. The economic savings are not as impressive, but the value of keeping 82 tons per year of paper waste out of a landfill should not be ignored. Students are also more open to a project like this than a mandatory reusable mug program. Only 10% of survey respondents reported having no reservations at all about the Driscoll reusable mug program, while 92% thought that having accessible compost bins would help us reduce the amount of trash we create (Figure 10). Possible problems also include people not removing lids and putting trash in the compost.

Dining Services, Facilities, and students will all need to work hard if any of these hypothetical scenarios were to become a reality. There is no reason why we cannot start to reduce the amount of paper cups that we use, especially since there are economic benefits that go hand in hand with the reduction in environmental impact.

References

Figures and Tables

Table 1 – Paper cup prices and purchases at Williams College.

<table>
<thead>
<tr>
<th>Type of Cup</th>
<th>Cost per Unit ($)</th>
<th>Units Purchased</th>
<th>Total Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bare Solo 12 oz.</td>
<td>74.93/1000 cups</td>
<td>339</td>
<td>25,401.27</td>
</tr>
<tr>
<td>Bare Solo 16 oz.</td>
<td>98.01/1000 cups</td>
<td>67</td>
<td>6,566.67</td>
</tr>
<tr>
<td>Bare Solo 10 oz.</td>
<td>60.82/1000 cups</td>
<td>1</td>
<td>60.82</td>
</tr>
<tr>
<td>Hot Paper 12 oz.</td>
<td>51.05/1000</td>
<td>83</td>
<td>4,237.15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>490</strong></td>
<td><strong>36,265.91</strong></td>
</tr>
</tbody>
</table>

Table 2 – Costs associated with having only reusable mugs on campus.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cups (2,500)</td>
<td>15,000 ($6 variety) – 22,500 ($9 variety)</td>
</tr>
<tr>
<td>Labor (10 hours/week @ $9/hour, )</td>
<td>4,860</td>
</tr>
<tr>
<td>Collection Bins (100-200 at ~$10 each)</td>
<td>1000-2000</td>
</tr>
<tr>
<td>Total First Year (highest case)</td>
<td>29,360</td>
</tr>
<tr>
<td>Replacement mugs (200-500/year)</td>
<td>1,200 – 3,000 ($6) – 1,800 – 4,500 ($9)</td>
</tr>
<tr>
<td>Cost per year (after first year)</td>
<td>~10,000</td>
</tr>
</tbody>
</table>

Table 3 – Costs associated with increasing composting of paper cups on campus.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor (2 student jobs – 6 student jobs)</td>
<td>4,860 – 14,580</td>
</tr>
<tr>
<td>Bins (~50)</td>
<td>5,000</td>
</tr>
<tr>
<td>Total</td>
<td>9,860 – 19,500 (average: 14,720)</td>
</tr>
</tbody>
</table>

Table 4 - Costs and savings associated with each presented scenario. Cost includes purchasing all items plus trash dumping fees, and all savings are compared to the “business as usual” scenario.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Cost ($)</th>
<th>Savings ($)</th>
<th>Net Cost ($)</th>
<th>Environmental Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business as Usual</td>
<td>60,815.91</td>
<td>n/a</td>
<td>60,815.91</td>
<td>small percentage of cups composted</td>
</tr>
<tr>
<td>Non-Compostable Cups</td>
<td>42,561.02</td>
<td>18,254.89</td>
<td>42,561.02</td>
<td>None</td>
</tr>
<tr>
<td>100% reusable (first year)</td>
<td>29,360</td>
<td>60,815.91</td>
<td>31,455.91</td>
<td>No cups to landfill</td>
</tr>
<tr>
<td>Composting Cups</td>
<td>68,975.91</td>
<td>6,560</td>
<td>68,975.91</td>
<td>Reduce cups to landfill, increase compost</td>
</tr>
</tbody>
</table>
Figure 1. About how many cups do you use per week?

Figure 2. 12 ounce cup available on campus.
Do you compost your paper cups?

[Pie chart showing the percentage of students who compost their paper cups:]
- always - 7.7%
- sometimes 44.2%
- rarely - 21.2%
- never - 26.9%

Figure 3. Pie chart showing how much students compost cups.

Did you know that the paper to-go cups from the dining halls are compostable?

[Pie chart showing the percentage of students who knew their cups were compostable:]
- Yes - 67.9%
- No - 32.1%

Figure 4. Pie chart showing how many students knew our paper cups are compostable.
Do you use paper cups from the dining halls/Eco Café?

![Pie chart showing percentage of students who use paper cups.](image)

Yes - 92.5%

No - 7.5%

Figure 5. Pie chart showing percentage of students who use paper cups.

Figure 6. $9 tumbler proposed by university of Colorado.
Figure 7. $6 mug proposed by university of Colorado.
Figure 8. Typical waste bins on campus.

Would you compost paper cups if there were easily accessible receptacles around campus?

- **Definitely - 69.8%**
- **Probably - 18.9%**
- **If I wouldn't have to go out of my way - 5.7%**
- **Probably Not - 3.8%**
- **Definitely Not - 1.9%**
Figure 9. Pie chart showing how students would use potential cup compost receptacles.

Figure 10. Pie chart showing student reaction to the Driscoll reusable mug program.